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DAIRY EXHIBITS

of the

UNITED STATES DEPARTMENT OF AGRICULTURE

at the

NATIONAL DAIRY EXPOSITION

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THE MILK FACTORY

That the inside of the cow is the darkest place on earth is a popular way of expressing the thought that very little is known of what goes on inside the cow in the process of milk production.

Observation and research, however, have brought to light a number of interesting facts concerning the process of making milk. These facts are illustrated in a general way in this exhibit by means of a cow six feet high whose stomach, intestines, udder, heart, etc. are pictured as parts of a milk factory, and the various organs as well as their functions are compared to similar machines in a manufacturing plant.

This cow, whose name is Belle, is equipped with a real voice produced by means of a special phonograph record and amplifiers. She explains the whole process of milk production to her owner in an effort to convince him that she must have a balanced ration in order to produce milk economically. Belle says "A cow makes milk of certain ingredients, according to a definite formula. The principal ingredients are proteins, carbohydrates, fats, minerals, and vitamins, and a certain proportion of each much be fed. If one or more of these ingredients are missing in my feed I cannot produce much milk, because I must have enough for my body first and what is left goes for milk production. This explains why a balanced ration containing these elements in the right proportion and in sufficient quantity should be fed to dairy cows." "And another thing", says Belle, "notice that the pumping system or heart keeps the process moving. A milk factory must have a strong pump, strong purifying system and mixing, breaking and sifting rooms of large capacity to handle large quantities of feed and make a great deal of milk. These things are important, but in themselves are not sufficient without the inheritance of the necessary impulse to utilize them to best advantage for milk production."

DOES DOUBLE DUTY

The dairy-herd-improvement association performs a double duty; first, it tests the cows for economical production of milk and butterfat; and second, it proves the sires by comparing the yearly production records of the daughters of each sire with the yearly production records of their dams. Through this comparison of the records of dams and daughters, the sires are tested with as great a degree of accuracy as the cows themselves. On the basis of production records, inferior cows and inferior bulls are culled out and discarded from our dairy herds.

Back of a window in this exhibit appears in rotation four different farms, each of which represent some typical accomplishment of the cow tester employed by the dairy-herd-improvement association. On the left of this exhibit the observer is invited to verify his judgment in selecting high-producing dairy cows. After he has made his choice from the photographs of five cows which are offered for selection, he presses a button and the records of these cows appear. On the right of the exhibit the observer may prove his ability in selecting bulls which will transmit high production, and his success may be measured by a gain by pressing a button which brings to light the comparison of the yearly production records of the daughters of each bull with the yearly production records of their dams.

THREE PLANES OF FEEDING

Three piles of feed, of different heights, represent three planes of feeding tried out on dairy cows at the Huntley, Montana, Dairy Experiment Station, of the Department of Agriculture. In one pile of feed we see only pasture, hay, and silage; in the next pile we see the pasture, hay and silage plus a limited amount of grain; and in the third pile there is practically the same amount of roughage plus a large amount of grain. In the rear of these piles of feed is a picture of the group of cows used in this experiment. During one lactation period the cows received the roughage rations; during a second lactation period they were fed roughage plus one pound of grain to each six pounds of milk produced; and during a third lactation period they were fed the same roughage plus one pound of grain mixture to each three pounds of milk produced.

All the cows were milked three times a day. The pasture consisted of irrigated tame grass; alfalfa was the only hay used; and corn silage furnished the remainder of the roughage ration. The results show that cows of more than average producing ability have sufficient capacity to consume enough nutrient for their needs from roughage alone provided the roughage is of the highest quality. In these experiments the cows on roughage alone produced milk and butterfat at lowest feed cost; while on the full grain ration the cows produced the largest quantity of milk and butterfat. At the cost of feeds and the returns for products that prevailed at Huntley, however, the cows were most profitable when on the limited grain ration.

TRANSMITTING ABILITY OF DAIRY SIRES

Those who regard themselves as good judges of dairy sires will have an opportunity to test their ability in the exhibit entitled "Transmitting Ability of Dairy Sires". At the entrance of this exhibit is a structure on which are seventeen miniature bulls standing on what appears to be the tan bark of the show ring. The visitor is handed a placing card, and after looking the bulls over he places the animals on four points as follows:

1. The bull that will sire the highest producing daughters.
2. The bull whose daughters will make the greatest increase in yield over their dams.
3. The bull within the breed which will sire the highest butterfat-testing daughters.
4. The bull that will transmit the best type.

On the inside of the exhibit is the actual proof of the merit of these sires. Each sire's photograph is shown again at the top of a section on the walls of the exhibit and just below are his daughters and their dams. The record of each animal is shown. All of these bulls were tested in herds owned by the Bureau of Dairy Industry or by cooperators.

This exhibit brings out the fact that the breeding ability of a bull for either type or production can be determined only by the actual breeding test, that is by the merit of his daughters and sons, and not by his appearance.

SWEET-CLOVER PASTURE

Sweet-clover pasture properly managed will carry more stock and return more profit than any grazing crop known to-day. A good stand of second-season sweet clover can carry two head of cows per acre from early spring till midsummer and cases are known where 4 head did not keep it down. Get the stock in early, when the clover is 6 inches high and put cattle enough on to keep it from blossoming; with one cow to an acre the clover gets old too fast.

For continuous grazing on sweet clover two fields are necessary, one that has just passed its first winter and one starting its first season's growth. Turn cattle on the older field in spring and keep them there till July 15th to 30th. By this time the sweet clover will bloom and get too woody to be palatable and the clover on the new field should be 6 to 8 inches high. The new clover will carry only about one half the stock the old field carried, and allowance must be made for that by having double the acreage or by having other pasture. An excess acreage in the fall is not a bad thing as any field not needed for grazing the next season, can be turned under the next spring for corn with great benefit to the corn.

After grazing stops on the older field the clover will make considerable growth and this can be plowed under in fall with great benefit to any succeeding crop.

There is less danger from bloat with sweet clover than with other clovers but cases have been known and the usual precautions should be taken.

SOY BEANS

An exhibit on soy bean culture and utilization enumerates the particular varieties of soy beans which are best adapted for hay, for seed, or for pasture in various sections of the country. This crop is more drought resistant and less sensitive to excess moisture than corn and yields an abundance of feed and forage. The seed should always be inoculated when soy beans are planted for the first time, warns this exhibit.

CLIMATIC AND SOIL ADAPTATIONS.- The soy bean has about the same range of climatic adaptations as corn. The Southern States and Corn Belt are most favorably situated for the production of seed, although early varieties introduced from northern Manchuria have greatly extended the profitable production of seed throughout the northern part of the United States. The soy bean succeeds on nearly all types of soil, but the best results are obtained on mellow, fertile, sandy loams, or clay loams.

CULTURE AND HARVESTING - Soy beans are sown from early spring when danger of frosts are over to mid-summer, depending largely on the latitude and use to be made of the crop. For seed production, 20 to 30 pounds of seed to the acre are required for rows 24 to 40 inches apart. When sown or drilled broadcast for hay or green manure, from 60 to 90 pounds to the acre are sufficient. The yields of seed range from 15 to 20 bushels to the acre in the Northern States and 25 to 35 in the Southern States. Under favorable conditions soy beans average 2 tons of hay to the acre.

VARIETIES - Varieties of soy beans are differentiated largely by the color and size of seed, though they also differ in maturity, habit of growth, yield, etc. The yellow-seeded varieties are preferred for the production of food, oil and meal, and include, late: Mammoth, Dixie and Tokio; medium late: Herman, Haberlandt, Chiquita; medium: Illini, Midwest, Dunfield and Mikado;

early: Ito San, Manchu, Elton, Hoosier, Wea, Mandarin, Minsoy, Aksarben and Soysota. For forage purposes the black and brown seeded varieties are most suitable and include, late: Otootan, Biloxi, Laredo, Goshen Prolific and Barchet; medium: Peking, Wilson-Five, George Washington and Virginia; early: Chestnut, Black Eyebrow and Wisconsin Black.

UTILIZATION - Soy beans may be used advantageously as either a seed or forage crop in many systems of rotation. They make good hay, as a silage and pasture and are valuable soilage crop. In combination with other crops such as corn, cowpea, Sudan grass, and sorghum it furnishes a well-balanced ration, a large yield and a great variety of forage.

BITTER WEED

"Bitter weed causes enormous losses each year due to unmarketable milk," is the message which appears on a giant milk can which forms the center of this exhibit. In front of this can are pictured the steps necessary to be taken in getting rid of bitter weed in pastures.

The sour milk problem has long been recognized and steps have been taken to prevent its attendant losses. It is too rarely recognized, however, that the production of milk containing weed flavors is causing an annual loss probably as great as that caused by sour milk. One of these weeds is bitter weed.

Bitter weed is an erect annual plant from 10 to 24 or more inches in height with a slender stem, usually much branched and with numerous very narrow almost branchlike leaves. Showy flower heads are yellow and from about three-fourths to one inch in diameter. This plant is most abundant from Virginia and Missouri to Florida and Texas, although it is found occasionally farther north. In the South it is the common weed of pastures and roadsides.

Bitter weed when eaten by a dairy cow gives a bitter astringent taste to the milk produced. In many cases the bitterness is so intense that the milk is not fit for human food. As this plant is abundant in large areas of the Southern States, losses from this cause are sometimes very great.

Specimens of the bitter weed are displayed in the exhibit and methods of making some use of the milk from cows that have eaten bitter weed are suggested.

DAIRY BY-PRODUCTS

Millions of dollars of wealth could be created if the enormous quantities of skim milk, buttermilk, and whey which are produced each year in the United States could be utilized more efficiently. This fact is emphasized in the exhibit by a river of skim milk which flows over a falls, only a part of which is diverted into factories and made into useful products.

On one side of the center feature are shown some of the more recent results of research on the problem of economic utilization of the products mentioned. By means of picture and charts it is shown that there is an optimum heat treatment which skim milk should receive before it is converted into a powder to be used in making bread and ice cream.

On the other side of the exhibit is a panel which describes briefly important factors in the manufacture of commercial buttermilk and concentrated sour skim milk. Suitable curves are used to show that the temperature employed in pasteurizing skim milk has a pronounced effect on the viscosity but not on the stability of commercial buttermilk. An important factor in manufacturing concentrated sour skim milk for use in baking is to get the proper amount of acid in the finished product, since the acid content of the finished product has a definite relation to its keeping quality and value for baking.

PASTEURIZATION OF FOAM

Milk plant operators and others interested in the proper pasteurizing of milk will be interested in an exhibit showing the importance of heating foam as well as the body of the milk during pasteurization. This exhibit shows that in over 80 per cent of the tests made the temperature of the foam was 5° F. or more lower than the corresponding milk; also that the bacterial count of the foam was considerably higher than that of the milk. It also shows that in two-thirds of the tests the bacterial count of the foam was, on an average, 176.3 per cent higher at the end of the holding period than it was at the beginning, whereas in every run the milk showed a decrease in count due to pasteurization. Better results were obtained in vats with tightly closed covers in comparison with those having loose or open covers.

Pasteurization as performed at the plants studied was not effective in raising the foam to a satisfactory pasteurizing temperature or in always accomplishing as great a destruction of bacteria in the foam as in the milk.

"SHALL I BE A DAIRY FARMER"

In many sections of the country farmers are wondering if they should continue in the same line of crop and livestock production that they have pursued in previous years. The quite general success of dairy farmers has induced many others to increase the number of cows from the few necessary to meet personal needs to herds large enough to produce market milk. In some sections of the country the business interests and the farmers' organizations have been considering the possibilities of changing the general type of agriculture from a one-crop method to a system of farming which would include the production of dairy products. There are many problems connected with the changes in type of farming and before a farmer goes into dairying on a scale large enough to make it a major product, he should consider a number of factors very carefully.

The exhibit which we are showing under this heading, "Shall I Be a Dairy Farmer?", proposes to hold up before the prospective farmer-dairyman some of the questions which he should ask himself before he goes in too deep. The exhibit is rather interestingly arranged. It shows a farmer coming out of the barn leading the family cow and proceeding toward a gateway which opens into a large landscape in which are seen a number of rather prosperous looking dairy farms. Over the gate is the question which is the title of the exhibit, "Shall I Be a Dairy Farmer?". When the gate swings open, as it does every few moments by means of a mechanical contrivance, a number of facts will be seen painted on the rails of the gate. These statements include questions regarding the farmer's ability to work with cows, the market conditions at hand, the availability of pasturage and feeds, and other pertinent queries.

When the gate closes statements are displayed on the other side of the gate indicating the reasons why it would not be desirable to attempt to go into dairying.

We are hoping by this means to raise questions in the minds of farmers who are thinking about going into the dairy business, so that they may be sure they are right before they go ahead.

MARKETING INFORMATION

The preparation of a display of marketing information is always fraught with some difficulties. How to show in an interesting way what kind of valuable information is available for the benefit of those who are buying and selling any particular commodity or commodities is not the easiest type of exhibit to prepare. Under the head of Dairy Marketing Information we are attempting in this exhibit to call to the attention of farmers and others the available Government market news reports which they would find valuable in their business of producing and selling dairy products. The exhibit that we are putting on will make use of a projection machine and screen upon which will be flashed, in the form of news notices, statements regarding market reports. These statements, which will be made in a striking manner somewhat after the fashion of lightning flashes, will show the purpose for each report and where it can be secured. Two figures stand in the exhibit, apparently reading the material which is thrown on the screen and it is thought that because the attention of the two figures seems directed towards the screen it will cause visitors in the aiseways to stop and see what the screen has to say.

"THE WORLD'S DAIRY BANQUET."

Milk and its products have been food for human kind since the beginnings of human life on the earth. Probably due to the climatic difference in different parts of the world dairying has become an industry more prominent in some sections than in others. The amount of dairy products used by peoples of different countries varies with the country and with the particular product in question. In the exhibit we are attempting to show the extent to which the various so-called dairy countries consume various products. Apparently Uncle Sam's appetite lags behind. The little country of Denmark leads in the consumption of fluid milk. Each individual in that country is supposed to consume a pint and a half of milk a day. Our neighbor to the north leads in the per capita consumption of butter. 1.12 ounces of butter is the daily per capita consumption in Canada. We would naturally expect that Switzerland would be the leader in the consumption of cheese, and this is true. The per capita consumption of cheese is approximately one ounce a day for every man, woman and child in that remarkable country.

Included in the exhibit are a few statistical facts which may be of interest to the visitors. One placard shows the amount of milk which is used in the production of butter, ice cream, condensed and evaporated milk, cheese, general household use and miscellaneous uses. It is rather staggering to read that 15,000,000,000 pounds of milk are poured into coffee and tea cups every year; that 500,000,000 pounds of milk are served in public eating houses; that the babies of the country consume 427,000,000 quarts of milk a year, and that 3,600,000,000 pounds are wasted either on the farms, in the factories, in milk distributing plants, or in the homes and that the baby calves get 3,900,000,000 pounds.

On the opposite wall of the exhibit some more statistics show the increase in the production of dairy products in the United States from 1920 to 1927. In seven years time we increased our butter production 73.3%. The household use of fluid milk increased 37.2%. 12.2% more cheese was produced in 1927 than in 1920. The United States is producing 29% more ice cream, 216% more casein, and 175% more dried skim milk which goes largely into the bakery trade. Condensed buttermilk has increased in production in seven years 204% and dried buttermilk 573%. These statistics may be dry and uninteresting to some people, but we are sure that there are some people who will be interested in knowing these things.

